

Said Potter, "Cancer may be the result of reducing the intake of foods that are metabolically necessary—it may be a disease of maladaptation."

Organic Farming Goes Big Time

"Going organic" is yielding unexpected success down on the farm as some brand-name corporations have decided not to use synthetic fertilizers and pesticides on much of their crop acreage. In doing so, they're challenging the idea that organic methods only work best on a small scale, and they are seeing improvements in crop quality as well as savings in pesticide-related costs per acre—without reduced yields.

California-based Gallo Vineyards is now the largest organic farm in the United States, with 6,000 of its 10,000 acres devoted to strict organic farming methods. These include mechanical cultivation to destroy weeds instead of herbicidal dustings; intercropping vineyards with nitrogen-producing peas and oats which fertilize the soil naturally; and reliance on natural predators, including spiders and ladybugs, rather than insecticides which must be applied several times a year.

In California, the leading agricultural state in the United States, where over 50% of the nation's fruits and nuts and 47% of its vegetables are produced, 50,000 acres are now certified "organic" and 20,000 more await such certification by California Certified Organic Farmers (CCOF) in Santa Cruz.

Over the last 10 years, nonchemical pest control and cultivation methods have gained wider acceptance among large and small growers nationally who must confront problems of pest resistance, a shrinking pool of federally approved pesticides, health effects of pesticide exposure among

farm workers, and environmental impacts of conventional agrichemicals. "The organic area is growing," says Harold S. Ricker, staff director of the USDA's National Organic Program. "Growers are definitely serious about trying to do something about these problems."

Organic methods are also gaining respect from a number of cotton growers throughout California (and in the arid high plains of Texas), much to the surprise of skeptics who said it couldn't be done. In California, more chemicals are used on cotton than on any other crop, almost half of which are defoliants or dessicants. But some cotton growers are succeeding with organic methods such as crop rotation with legumes; reliance on beneficial insects; composting and use of cover crops as main sources of nutrients; aerial spraying of zinc to promote cotton boll maturity; and pre-harvest water cut-off to aid natural desiccation.

However, the major barrier to large-scale organic cotton production in California remains a lack of effective alternatives to chemical defoliation. Conventional defoliants facilitate mechanical harvesting by eliminating leaves that may jam the picker. Defoliation also prevents chlorophyll staining from live leaves and helps reduce seed cotton moisture content, a key cause of composting during storage. Without conventional defoliants, farmers must pay for hand-labor or harvest without defoliating and risk moisture contamination.

According to Brian Baker, CCOF technical coordinator, organic cotton growers are undeterred by the obstacles. Once established, cotton can hold its own against weeds without conventional herbicides, and a program of rotation, tillage, and timely cultivation can keep hand-labor costs to a minimum. Says Baker, "To date,

CCOF has certified 1500 acres with 6000 more in the pipeline and more to come." In addition, a growing market for higher-priced organically farmed cotton is helping defray the roughly 15% increase in production costs largely due to labor. Hoping to reap marketing benefits from environmental consciousness, some brand-name manufacturers are willing to pay almost twice the conventional cotton price.

Still, despite success stories, cautions have arisen against fully embracing organic farming methods. Leonard Gianessi, senior research associate at the National Center for Food and Agricultural Policy in Washington, DC, says the idea that researchers could develop a program to find effective nonchemical substitutes for all uses of chemical pesticides is not realistic. He sees increasing concern among entomologists over biological control methods, such as breeding and releasing natural predators to reduce pest populations, which may carry unrecognized risks including the possibility of insect species extinction. Gianessi also points to current uncertainties surrounding use of microbial pesticides in terms of their impact on people, animals, and the environment.

USDA's Ricker is optimistic. He says his program is focused on developing national standards for organic production, processing, and marketing. Ricker characterizes most organic growers as "serious business people who are concerned about their environment and work methods. They have demonstrated they can apply organic production techniques on a large scale and in all environments."

Ozone-Friendly Chemicals

As the federal government begins to phase out chlorofluorocarbons (CFCs) for contributing to stratospheric ozone depletion, scientists are searching for alternative chemicals that are considered "ozone friendly."

Scientists at the National Oceanic and Atmospheric Administration announced in January that extensive research on hydrofluorocarbons (HFCs) shows that they will not destroy the ozone layer as CFCs do. A. R. Ravishankra, a chemist at the NOAA laboratory, said HFCs are about 50,000 times less destructive of ozone than CFCs and remain in the atmosphere only 15 years, whereas CFCs linger for 50 years.

The NOAA studies began last March after an Oxford University scientist suggested that the fluorine in HFCs could possibly combine with carbon in the atmosphere to create a reaction that would destroy ozone. This was a "plausible speculation" that has been proven wrong.

The HFCs could possibly replace



Joshua Ets-hokin

Cotton club. Organic growing methods are gaining acceptance as cotton farmers search for alternatives to chemical pesticides and defoliants.